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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/713,412

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EXAMINER

NGUYEN, PHILLIP H

ART UNIT

PAPER NUMBER

2191

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/713,412	CANTRILL, BRYAN M.	
	Examiner	Art Unit	
	Phillip H. Nguyen	2191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20040315</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the original filing November 14, 2003. Claims 1-28 are pending and have been considered below.

Drawings

2. The drawings are objected to under 37 CFR 1.83(b) because they are incomplete. 37 CFR 1.83(b) reads as follows:

When the invention consists of an improvement on an old machine the drawing must when possible exhibit, in one or more views, the improved portion itself, disconnected from the old structure, and also in another view, so much only of the old structure as will suffice to show the connection of the invention therewith.

3. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the instrumented program (116) as described in the specification (paragraph 0014-0015, and 0022). Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the

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remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: The specification describes "instrumented program (116)" relating to FIGURE 1 (paragraph 0014-0015, and 0022). However, "instrumented program (116)" is not described in the drawings.

Appropriate correction is required.

Claim Objections

5. Claims 7 and 8 are objected to because of the following informalities: Claims 7 and 8 should depend on claim 6 instead of claim 4.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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7. Claims 7 and 8 recite the limitation "cacheable" in respect to claim 4. There is insufficient antecedent basis for this limitation in the claim. It is unclear to the examiner whether claims 7 and 8 are further comprised new limitations or further limited their parent claim 4, which does not have any connection with claims 7 and 8. For examining purposes, the examiner assumes claims 7 and 8 depend on claims 6.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-23, 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Hrischuk et al. (United States Patent No.: US 6,807,583 B2).

As per claim 1:

Hrischuk discloses a method for caching in a tracing framework, comprising:

- firing a probe associated with a thread (**"executing the instrumented process to produce a trace of the process execution"** Col 10, line 37-38, **a probe is embedded in the instrumented program**);

- evaluating a first predicate of the probe ("**fork(e,k)** True if event e is a fork event that forked the process thread |j,k|, otherwise it is false" Col 23, line 29-30);
- caching the first predicate in a predicate cache associated with the thread, based on the evaluating of the first predicate and cacheability of the first predicate ("**The table refers to recording events,... The Precondition State of Object i1 Column lists the predicates and conditions which must all be true for the instrumentation primitives to be executed**" Col 28, line 40-45); and
- transferring control to the thread, based on the caching ("**nextTask (e1, e2)**" Table 1).

As per claim 2:

Hrischuk discloses the method as in claim 1 above; and further discloses:

- wherein the evaluating comprises determining a Boolean value of the first predicate ("**True/False**" Col 23, line 29-30, **Boolean is a logical true/false values**).

As per claim 3:

Hrischuk discloses the method as in claim 2 above; and further discloses:

- wherein the Boolean value is true ("**True**" Col 23, line 29).

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As per claim 4:

Hrischuk discloses the method as in claim 3 above; and further discloses:

- executing an action ("**tracing**") of the probe ("**The instrumentation interacts with the storage devices and other system resources to prove tracing of the simulation of a design in the form of an abstract execution...**" Col 12, line 30-36).

As per claim 5:

Hrischuk discloses the method as in claim 2 above; and further discloses:

- wherein the Boolean value is false ("**False**" Col 23, line 30).

As per claim 6:

Hrischuk discloses the method as in claim 5 above; and further discloses:

- determining whether the first predicate is cacheable ("**Fork(e,k) True if event e is a fork event that forked the process thread [j,k], otherwise it is false...**" Col 23, line 28-35).

As per claim 7:

Hrischuk discloses the method as in claim 6 above; and further discloses:

- wherein cacheable is the first predicate referencing an immutable variable ("**True/False**" Col 23, line 28-30, **True/False are immutable variables**).

As per claim 8:

Hrischuk discloses the method as in claim 6 above; and further discloses:

- wherein cacheable is the first predicate referencing a thread-specific variable ("**P is a set of event predicates**" Col 21, line 58, **P is a thread specific variable**).

As per claim 9:

Hrischuk discloses the method as in claim 6, and further comprising:

- identifying the first predicate using a predicate cache identifier ("see for example, **Table 5, and text which further expand their features**, Col 26, 27...);
- storing the predicate cache identifier with the probe as a probe cache identifier ("**one event is recorded per instrumentation item**" Col 26, line 59-60; **a probe is embedded in instrumented program and recorded with one event**); and
- storing the predicate cache identifier in the predicate cache (see for example, **Table 5, and text which further expand their features**, Col 26, 27, ...).

As per claim 10:

Hrischuk discloses the method as in claim 1 above; and further discloses:

- wherein the transferring occurs if the first predicate is cache in the predicate cache (**"the analyst adds process specific instrumentation to identify where the execution of each distributed process begins and ends... software interrupts which signify an external event are easily instrumented as an external event and generate a unique process name automatically to start an angio trace"** Col 29, line 20-28).

As per claim 11:

Hrischuk discloses the method as in claim 9 above; and further discloses:

- wherein the probe further comprises a second predicate of the probe (**"isHJoin(e) True if event e is a half-join event; otherwise, it is false"** Col 23, line 46; also see for example, **"Table 5"**, shows a plurality of predicates).

As per claim 12:

Hrischuk discloses the method as in claim 11 above; and further discloses:

- evaluating the second predicate of the probe (**"isHJoin(e) True if event e is a half-join event; otherwise, it is false"** Col 23, line 46).

As per claim 13:

Hrischuk discloses the method as in claim 12 above; and further discloses:

- wherein the evaluating comprises determining a Boolean value of the second predicate ("**True/False**" Col 23, line 46, **Boolean is a logical true/false values**).

As per claim 14:

Hrischuk discloses the method as in claim 13 above; and further discloses:

- wherein the Boolean value is true ("**True**" Col 23, line 46).

As per claim 15:

Hrischuk discloses the method as in claim 14 above; and further discloses:

- executing an action ("**tracing**") of the probe ("**The instrumentation interacts with the storage devices and other system resources to prove tracing of the simulation of a design in the form of an abstract execution...**" Col 12, line 30-36).

As per claim 16:

Hrischuk discloses the method as in claim 13 above; and further discloses:

- wherein the Boolean value is false ("**False**" Col 23, line 46).

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As per claim 17:

Hrischuk discloses the method as in claim 16 above; and further discloses:

- determining whether the second predicate is cacheable ("**isHJoin(e)**
True if event e is a half-join event; otherwise, it is false" Col 23,
line 46).

As per claim 18:

Hrischuk discloses the method as in claim 17 above; and further discloses:

- identifying the second predicate using the predicate cache identifier, if
the first and second predicate are the same (see for example "**Table**
5", and text which further expand their features, Col 26, 27, ...).

As per claim 19:

Hrischuk discloses the method as in claim 18 above; and further discloses:

- wherein cacheable is the first predicate referencing an immutable
variable ("**True/False**" Col 23, line 28-30, **True/False are immutable**
variables); and
- the first predicate and the second predicate having the same identifier
("**a process thread is identified with the process scenario name**
and the process thread identifier, such as |L,k|. Information
recorded with each event is used by the event predicates" Col 23,

line 17-18, 26-27, which means, first predicate and second predicate having the same thread identifier).

As per claim 20:

Hrischuk discloses the method as in claim 18 above; and further discloses:

- wherein cacheable is the first predicate referencing a thread-specific variable ("**P is a set of event predicates**" Col 21, line 58, **P is a thread specific variable**); and
- the first predicate and the second predicate having the same identifier ("**a process thread is identified with the process scenario name and the process thread identifier, such as |L,k|. Information recorded with each event is used by the event predicates**" Col 23, line 17-18, 26-27, which means, first predicate and second predicate having the same thread identifier).

As per claim 21:

Hrischuk discloses the method as in claim 1 above; and further discloses:

- determining whether the first predicate is cached ("**The table refers to recording events for the object i1 and its instrumentation state vector may be used to determine which events to record**" Col 28, which means, determining whether the first predicate is cached since each recorded event includes predicates); and

- determining whether the predicate cache is valid (**"if the precondition values of object i1 are met, then execute the instrumentation primitives to record the identified events"** Col 27-28, line 67; line 1-2).

As per claim 22:

Hrischuk discloses the method as in claim 21 above; and further discloses:

- wherein the determining whether the predicate is cached comprises comparing whether the probe cache identifier and the predicate cache identifier stored in the predicate cache are equivalent (**"to identify where synchronization between process threads occurs"** Col 29, line 41-42, **in order to perform the identification, the process thread identifiers must be used to compare between events and thread identifiers are included predicate cache identifiers**).

As per claim 23:

Hrischuk discloses the method as in claim 21 above; and further discloses:

- wherein the determining whether the predicate cache identifier is valid comprises comparing whether the probe cache identifier and the predicate cache identifier stored in the predicate cache are non-zero (**"if the precondition values of object i1 are met, then execute the**

**instrumentation primitives to record the identified events” also
see for example, Table 5, the identifier are non-zero).**

As per claim 28:

Hrischuk discloses a computer system for caching in a tracing framework
comprising:

- a processor (Col 31, line 19);
- a memory (Col 32, line 36);
- a storage device (Col 12, line 32);
- software instructions stored in the memory for enabling the computer system to:
 - o fire a probe associated with a thread (**“executing the instrumented process to produce a trace of the process execution” Col 10, line 37-38, a probe is embedded in the instrumented program**);
 - o evaluate a first predicate of the probe (**“fork(e,k) True if event e is a fork event that forked the process thread [j,k], otherwise it is false” Col 23, line 29-30**);
 - o cache the first predicate in a predicate cache associated with the thread, based on the evaluating of the first predicate and cacheability of the first predicate (**“The table refers to recording events.... The Precondition State of Object i1**

Column lists the predicates and conditions which must all be true for the instrumentation primitives to be executed"

Col 28, line 40-45); and

- o transfer control to the thread, based on the caching ("**nextTask (e1, e2)**") Table 1).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hrischuk et al. (United States Patent No.: US 6,807,583 B2) as applied to claim 1 above, and further in view of Levine et al. (United States Patent No.: 5,894,575).

As per claim 24:

Hrischuk discloses the method as in claim 1 above, but does not explicitly disclose invalidating the predicate cache.

However, Levine discloses an analogous method performs invalidating the cache ("**the content of that cache is invalidated**" Col 3, line 51-52).

Therefore, it would have been obvious to one having an ordinary skill in the art at the time the invention was made to modify Hrischuk's method to have the cache

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invalidating. One of the ordinary skilled in the art would have been motivated to modify Hrischuk's method to include cache invalidating **in order to accurately reconstruct an instruction trace** (Col 3, line 49).

As per claim 25:

Hrischuk and Levine disclose the method as in claim 24 above; and Levine further discloses:

- wherein the invalidating comprises setting the predicate cache to zero (**"cache are either cleared or invalidated"** Col 7, line 51, **clearing a cache is the same as setting the cache to zero**).

As per claim 26:

Hrischuk and Levine disclose the method as in claim 24 above; and Hrischuk further discloses:

- wherein the invalidating is a result of a thread specific variable being stored (**"the table refers to recording events for the object i1 and its instrumentation state vector..."** Col 28, line 40-41).

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As per claim 27:

Hrischuk and Levine disclose the method as in claim 1 above; and Levine further discloses:

- setting the predicate cache to zero initially ("**initial state of a cache upon the initiation of an instruction trace. Without requiring the time necessary to invalidate an entire cache**" Col 7, line 7-9).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Munson (United States Patent No.: US 7,396,499 B2) discloses method and system for simplifying the structure of dynamic execution profiles.
- b. Ramasamy et al (United States Patent No.: US 6,931,632 B2) discloses instrumentation of code having predicated branch call and shadow instructions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip H. Nguyen whose telephone number is (571) 270-1070. The examiner can normally be reached on Monday - Friday 10:00 AM - 3:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wei Y. Zhen can be reached on (571) 272-3708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PN
12/1/06

Wei Zhen
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